

WHAT IS CLAIMED IS:

- 1 1. A scanning device comprising:
2 a functional surface portion;
3 support structure pivotally supporting said functional surface portion along a first axis by
4 a pair of torsional hinges having a resonant frequency such that said pivoting of said functional
5 surface portion about said pair of torsional hinges pivots about said first axis;
6 at least one first magnet located along said first axis;
7 a first magnetic driver located below and cooperating with said at least one first magnet
8 for causing oscillation about said pair of torsional hinges at a selected frequency.
- 1 2. The scanning device of claim 1 wherein said at least one first magnet has a diametral
2 charge perpendicular to the axis of rotation and substantially parallel to said reflecting surface
3 and wherein said first magnetic driver is at least one coil located proximate said one first magnet.
- 1 3. The scanning device of claim 2 wherein said at least one first magnet comprises two first
2 magnets, one each located adjacent one each of said first pair of torsional hinges.
- 1 4. The scanning device of claim 1 wherein said at least one first magnet has an axial charge
2 and wherein said magnetic driver is an electromagnet having legs extending to each side of its
3 corresponding magnet.
- 1 5. The scanning device of claim 1 wherein said at least one first magnet is mounted at the
2 center of said functional surface.
- 1 6. The scanning device of claim 1 wherein said support structure comprises a gimbal
2 portion connected to said functional surface along said first axis by said pair of torsional hinges

3 and a support member pivotally supporting said gimbal portion by a second pair of torsional
4 hinges along an axis substantially orthogonal to said first axis, such that said pivoting of said
5 device about said second pair of torsional hinges results in movement substantially orthogonal to
6 said first direction;

7 at least two second magnets mounted along said second axis and one each located
8 adjacent each one of said second pair of torsional hinges; and

9 a second magnetic driver cooperating with said at least two second magnets for pivoting
10 said device about said second pair of torsional hinges to provide said orthogonal movement.

1 7. The scanning device of claim 1 wherein said functional surface is a light grating
2 positioned to intercept a beam of light.

1 8. The scanning device of claim 1 wherein said functional surface is a reflective surface or
2 mirror positioned to intercept a beam of light.

1 9. The scanning device of claim 6 wherein said functional surface is a reflective surface or
2 mirror positioned to intercept a beam of light.

1 10. The scanning device of claim 8 used as the drive engine of a printer.

1 11. The scanning device of claim 9 used as the drive engine of a printer.

1 12. The scanning device of claim 9 used as the drive engine of a visual display device.

1 13. The scanning device of claim 1 wherein said functional surface oscillates at its resonant
2 frequency.

1 14. The scanning device of claim 9 wherein said functional surface oscillates at its resonant
2 frequency.

1 15. A printer comprising:

2 a light source providing a modulated beam of light;

3 a scanning mirror comprising a reflective surface portion positioned to intercept said
4 beam of light and a support structure pivotally supporting said reflective surface portion along a
5 first axis by a pair of torsional hinges such that said pivoting of said reflective surface portion
6 about said pair of torsional hinges results in said reflected light beam sweeping back and forth in
7 a first direction;

8 at least one first magnet located along said first axis;

9 a first magnetic driver located below and cooperating with said at least one first magnet
10 for causing said back and forth sweeping movement of said reflective surface about said pair of
11 torsional hinges;

12 a moving photosensitive medium having a first dimension and a second dimension
13 orthogonal to said first dimension, and located to receive an image of said reflected light beam as
14 it sweeps back and forth across said moving photosensitive medium along said first dimension,
15 said photosensitive medium moving in a direction along said second dimension such that an
16 image of a subsequent trace of light is spaced orthogonally from a previous trace.

1 16. The printer of claim 15 wherein said moving photosensitive medium is cylindrical shaped
2 and rotates about an axis through the center of said cylinder.

1 17. The printer of claim 15 wherein said printer is a bi-directional printer.

1 18. The printer of claim 15 wherein said at least one first magnet comprises two first
2 magnets, one each located adjacent one each of said first pair of torsional hinges.

1 19. The printer of claim 15 wherein said at least one first magnet has a diametral charge
2 perpendicular to the axis of rotation and substantially parallel to said reflecting surface and
3 wherein said first magnetic driver is a coil located proximate said one first magnet.

1 20. The printer of claim 15 wherein said at least one first magnet has an axial charge and
2 wherein said magnetic driver is an electromagnet having legs extending to each side of its
3 corresponding magnet.

1 21. The printer of claim 15 wherein said back and forth sweeping motion is at the resonant
2 speed of said scanning mirror.

1 22. The printer of claim 15 wherein said at least one first magnet is located at the center of
2 said reflective surface portion.

1 23. A bi-directional printer comprising:
2 a light source providing a modulated beam of light;
3 a scanning mirror device comprising a reflective surface portion positioned to intercept
4 said beam of light from said light source, said reflective surface pivotally attached along a first
5 axis to a gimbals portion by a first pair of torsional hinges, and said gimbals portion pivotally
6 attached to a support member by another pair of torsional hinges, such that pivoting of said
7 device about said first pair of torsional hinges results in light reflected from said reflective
8 surface sweeping back and forth, and pivoting of said device about said another pair of torsional
9 hinges results in said reflective light moving in a second direction substantially orthogonal to

10 said sweeping beam of light;
11 at least one first magnet located along said first axis;
12 a first magnetic driver located below and cooperating with said at least one first magnet
13 for causing said pivoting about said first pair of torsional hinges;
14 at least two second magnets mounted along said second axis and one each located
15 adjacent each one of said another pair of torsional hinges;
16 a second magnetic driver cooperating with said at least two second magnets for pivoting
17 said mirror device about said another pair of torsional hinges to provide said orthogonal
18 movement to said sweeping beam of light; and
19 a moving photosensitive medium having a first dimension and a second dimension
20 orthogonal to said first dimension, and located to receive an image of said reflected light beam as
21 it sweeps or traces across said photosensitive medium along said first dimension as said mirror
22 device pivots about said first pair of said torsional hinges, said photosensitive medium moving in
23 a direction along said second dimension such that an image of a subsequent trace of light is
24 spaced from a previous trace.

1 24. The bi-directional printer of claim 23 wherein said moving photosensitive medium has
2 cylindrical shape and rotates about an axis through the center of said cylinder.

1 25. The bi-directional printer of claim 23 wherein said at least one first magnet has a
2 diametral charge perpendicular to the axis of rotation and substantially parallel to said reflecting
3 surface and wherein said first magnetic driver is an air coil located proximate said one first
4 magnet.

1 26. The bi-directional printer of claim 23 wherein said at least one first magnet has an axial
2 charge and wherein said magnetic driver is an electromagnet having legs extending to each side
3 of its corresponding magnet.

1 27. The bi-directional printer of claim 23 wherein said at least one first magnet is located at
2 the center of said reflective surface portion.

1 28. The bi-directional printer of claim 23 wherein said pivoting of said device about said first
2 pair of torsional hinges occurs at the resonant speed of said mirror.

1 29. The bi-directional printer of claim 23 wherein said at least one first magnet comprises
2 two first magnets locate one each adjacent one each of said first pair of torsional hinges and said
3 first magnetic driver is a pair of coils located one each proximate one each of said two first
4 magnets.

1 30. The bi-directional printer of claim 23 wherein said at least one first magnet comprises
2 two first magnets and said magnet driver is a pair of magnetic drivers located one each proximate
3 one each of said two first magnets.